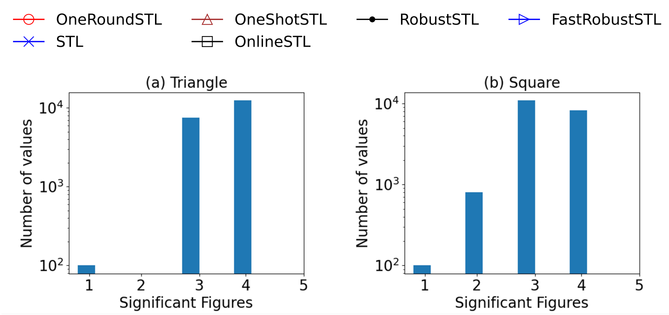

Fig. 1: Exp on Threshold Determination

APPENDIX

A. Pre-calculation Algorithm

Algorithm 1 shows the details of OneRoundSTL pre-calculation. Line 1 constructs the vector b using the original data x and the baseline seasonal component v obtained in the cold start phase. If a missing value is encountered, Lines 4 utilize missing values handling method. Otherwise, Line 6 pre-calculates each b_i.

Algorithm 1: OneRoundSTL Pre-calculation

Input: $x \in \mathbb{R}^N, t \in \mathbb{R}^N, v \in \mathbb{R}^T, L \in \mathbb{R}^{2N\times 2N}, D \in \mathbb{R}^{2N\times 2N}$

Output: $z \in \mathbb{R}^{2N}$

```
1 construct b ∈ R^{2N} by Formula ??;
2 foreach b_i do
3     if b_i is missing then
4         calculate z_i by Formula ??
5     else
6         calculate z_i by Formula ??
7 return z;
```

As for time complexity, the construction and forward substitution time complexity of each b_i is O(1). Its total time complexity is O($2N$).

As for space complexity, i.e., space cost of pre-calculated results z, it is closely related to the original data, and each x_i corresponds to two z_i. Therefore, we store its corresponding x and z in the same page. The space complexity of z is O($2N$).

B. Experiment on Threshold Determination

We will present methods for determining the threshold parameters ϵ and ζ in sections 3.2 and 5. Specifically, we utilize the dataset's precision to establish these thresholds. ϵ governs the precision of L and D, which, as shown in Figure 2, undergo a squaring operation during usage. Consequently, epsilon is determined by the square root of the dataset's precision. In contrast, ζ determines the precision of the intermediate variable z, which involves only linear operations. Hence, zeta is set equal to the dataset's precision.

Figure 1 illustrates the distribution of significant figures across the dataset. We select the significant figures corresponding to the peak, which in this case represents the dataset's precision of 1e-4. Therefore, ϵ is set to 1e-2 and ζ is set to 1e-4. As demonstrated by Figures 4 and 5, this threshold selection provides OneRoundSTL with high performance and low time overhead, validating the effectiveness of our threshold determination method.